

POVERTY MEASUREMENT METHODOLOGY IN ARMENIA

SOUTH CAUCASUS POVERTY, EQUITY AND GENDER TEAM

POVERTY AND EQUITY GLOBAL PRACTICE

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The report was prepared by a team led by Alan Fuchs (Senior Economist, EECPV) and Dhiraj Sharma (Economist, ECCPV), and comprising Maria Fernanda Gonzalez Icaza (ETC, EPVGE), Katerine Yaneth Ramirez Nieto (Consultant, EPVGE), and Laxman Timilsina (Consultant, EPVGE). The work was undertaken under the guidance of Salman Zaidi (Practice Manager, EECPV), Sylvie K. Bossoutrot (Country Manager, Armenia), and Evgenij Najdov (Program Leader, EECDR). The peer reviewers were Cesar Cancho (Senior Economist, ESAPV) and Gabriel Lara Ibarra (Senior Economist, ELCPV). The team was ably assisted by Armanda Carcani (Program Assistant, EECPV).

Executive Summary

Alleviating poverty and increasing shared prosperity among all citizens are important policy objectives in Armenia. To monitor historical progress towards this goal and support the design of evidence-based policies economic welfare and poverty must be accurately and consistently measured. On top of that, monitoring poverty and inequality requires that regular updates of the methodology and data collection process be incorporated to reflect the current needs, preferences, and standards of living of society.

There are three main steps to welfare measurement. First, define an indicator of welfare (e.g. consumption aggregate). Second, establish a minimum acceptable standard of living or the poverty line. And finally, aggregate the information from the distribution of the welfare indicator relative to the poverty line, to identify the poor and non-poor populations.

The measurement of poverty in Armenia follows the cost of basic needs (CBN) approach. The basic notion behind the CBN is to quantify the monetary value of a consumption basket that fulfills households' basic food and non-food needs. Poor households are identified as those whose budget/consumption is insufficient to afford the value of such basket.

This note outlines the methodology for measuring poverty in Armenia based on data from the Integrated Living Conditions Survey (ILCS) 2019. The last update to the methodology used data from the ILCS 2009. From 2009 to 2018, the annual poverty measurement in Armenia relied on an annual update of the poverty lines to changes in the price level of the economy, using the consumer price index (CPI). However, for 2019, to reflect changes in consumption patterns, spending habits, demographic structure, among other, the consumption basket and poverty lines are recalculated. The poverty rates obtained from the 2019 ILCS differ from the poverty trends since 2009 in three ways: (I) the consumption aggregate is calculated using the data from a revised survey questionnaire of the ILCS, (II) the ILCS introduced a new data collection methodology based on computer-assisted personal interviews (CAPI) in 2019, and (III) the poverty lines were rebased in 2019. This note describes the three methodological pillars and the relevant technical decisions taken in constructing the new poverty measurement.

Construction of the household-level welfare measure

The welfare level of Armenian households is determined by calculating the value of total monthly consumption per adult equivalent. The household consumption aggregate is calculated each year based on consumption data collected through the ILCS. The household survey collects consumption data on both the value of food and non-food items. Following the standard methodology, the consumption aggregate also includes consumption from home production, as well as in-kind aid received from humanitarian organizations and other sources.

Food and non-food components are measured differently. For the food component, the ILCS 2019 requires households to fill in a diary, reporting information on the quantity of food consumed daily during a 14-day period. The reported consumption of food items is then valorized using unit prices specific to each item. Those unit prices are computed at the local level using diary information on actual purchases.

Non-food consumption comprises the following categories: alcoholic beverages & tobacco, clothing & footwear, household goods, transportation, utilities, recreation, education, and health. It also includes values of in-kind non-food consumption of goods and services received free of charge. The estimates of the user value of durable goods – the value of flow of services received from durables which are purchased and owned by a household – also add to the non-food component of consumption.

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The nominal consumption aggregate is deflated using a two-dimensional price deflator to reflect price differences between quarters and between regions, urban and rural areas. The total consumption aggregate is then expressed in average annual national price levels. Adjustment to the consumption aggregate is also done to account for both scale effects within the household and the differential in needs between the different demographics within the household. Dividing total household consumption by the number of adult equivalent members gives us the household-level consumption aggregate on which poverty and inequality analysis will be performed. Finally, adjustment is also made to account for the number days household members were absent from the household during the survey period.

Construction of four poverty lines

A poverty line defines, in monetary terms, the value of goods (food and non-food) and services that meet the needs of the minimum level of living standards in the country. The minimum consumer basket consists of two components: a minimum food basket and an allowance for basic non-food goods and services.

Four different poverty lines are calculated in Armenia:

- (i) a food poverty line;
- (ii) a lower poverty line which uses a lower bound of the allowance for basic non-food goods and services in addition to the food poverty line;
- (iii) an upper poverty line which uses an upper bound of the allowance for basic non-food goods and services on top of the food poverty line; and
- (iv) an average poverty line, which is the average of the lower and upper poverty lines.

The food poverty line is based on the minimum energy requirement (MER) for one average person in the population to perform their regular daily activities. Based on demographic characteristics of the population of Armenia the average MER was calculated at 2,307 kilocalories (kcal) per person per day in 2019. The food poverty line then is computed as the cost of reaching that minimum using the “Cost of basic needs” approach. In other words, in the context of Armenia, we calculate how much does it cost to purchase a food basket of 2,307 calories. The food poverty line reflects the cost of the minimum food basket which is established according to the actual consumption patterns of a reference population.

To value the food basket of a typical household in the low-income population, the average basket of households in second, third or fourth consumption deciles is used. The value of the food poverty line for 2019 was estimated at 23,763 AMD per month per adult equivalent and the food poverty rate was 1.4% of the population.

Individuals have non-food needs in addition to basic alimentary or nutrition needs. Having already set the food poverty line, two additional thresholds or poverty lines are calculated by adding an allowance for the consumption of non-food goods and services to the value of the minimum food basket. In this context, two methods to determine the allowance for non-food consumption are used. To estimate the lower poverty line, we calculate the median non-food consumption of households whose **total consumption** per adult equivalent falls within a small interval (5%) of the food poverty line. The median is added to the food poverty line to obtain the lower poverty line.

The recommended lower poverty line for 2019 is 35,054 AMD per month per adult equivalent and the lower poverty rate is 10.2% of the population in 2019. Likewise, to estimate the upper poverty line, we calculate the median non-food consumption of households whose **food consumption** per adult equivalent falls within a small interval (5%) of the food poverty line. The median is added to the food poverty line to obtain the upper poverty line.

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With this approach, the upper poverty line per adult equivalent in 2019 comes to 53,043 AMD per adult equivalent per month and the upper headcount poverty rate is 43.8% of the population.

At the same time, the estimated average poverty line, which is the average of the lower and upper poverty lines, amounts to 44,048 AMD per adult equivalent per month and the average poverty rate is 26.4% of the population.

Introduction

Poverty can be generally summarized as a “pronounced deprivation in well-being” (Houghton and Khandker, 2009). Under this general statement, however, there are multiple conceptions, definitions, and measurements of poverty. Traditionally, poverty is viewed as insufficient command over commodities, so that households without enough income or consumption are deemed to be poor. Poverty may also be defined in terms of specific commodities, such as food, energy, and housing. The capability approach measures poverty as an individual’s capability to function in a society (Sen, 1985). By this view, people with inadequate income, education, political freedoms, or with poor health are all deprived in some area that prevents them from living a flourishing life. The decision on which approach to adopt is beyond the scope of the technocratic exercise and must be guided by a societal consensus.

Poverty in Armenia has primarily been measured in monetary terms using the cost of basic needs (CBN) approach. Under the CBN approach, the minimum daily energy requirement (in kilocalories) is first determined based on the population structure and the physical activity level of the population. Next, the minimum food expenditure necessary to acquire the daily energy requirement is calculated from the diet of a reference population. The monetary value of this expenditure is the food poverty line. Finally, allowances for non-food basic needs, such as utilities and clothing, are added to the food poverty line to calculate the expenditure necessary to meet the minimum standard of a society. The poverty line varies from country to country because it is based on the consumption pattern, tastes and habits, and the societal notion of acceptable living standards in society.

The national poverty lines for Armenia were last constructed using data from the 2009 round of the Integrated Living Conditions Survey (ILCS). The last lines were also based on the CBN approach, which was eventually endorsed by the government. Since then, poverty measurement in Armenia has relied on an annual update to the poverty lines using the consumer price index (CPI). This adjustment by inflation rate accounts for changes in price-levels in the economy, keeping the poverty lines fixed in real terms. The adjustment, however, does not account for the secular change in the patterns of consumption that occurs over time. As the economy grows and households become richer, the share of household consumption on food generally declines while the share of consumption on non-food items usually rises. At the same time, the diet may also change, with meat and animal protein constituting a relatively higher share of food consumption. These effects influence both the cost per calorie and the spending pattern on non-food items. The farther away from the year of data collection, the less accurately the poverty lines reflect the consumption pattern and the minimum consumption threshold of the population. Poverty lines therefore must be updated frequently to stay current with the changing consumption pattern, tastes and habits, and the demographic structure of the population. It had been 10 years since the poverty lines were last constructed in Armenia, so it was an opportune time to help the government update the national poverty lines based on the most recent data.

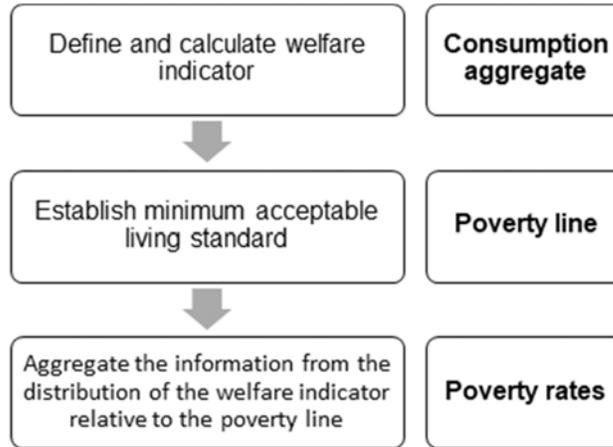
The 2019 round of ILCS also saw several changes to the questionnaire and in the mode of data collection. Until 2018, data on food expenditure and consumption were captured using a 30-day diary for households to keep track of their consumption expenditures. Starting in 2019, the reference period for the food diary was shortened to two weeks (or 14 days). Several modules of consumption that were previously part of the household diary were moved to the non-diary modules, among them health, communication, and education. Finally, until 2018, the data for the non-diary modules were collected using a Pen-and-Paper Personal Interview (PAPI) method, while the data collection mode was upgraded to Computer-Assisted Personal Interview (CAPI) in 2019.¹ Changes in the length of the diary period and survey mode may affect the reporting of consumption.

¹ Food consumption was still recorded on paper diaries.

Chapter 1: Constructing the consumption aggregate

There are three main steps to welfare measurement (Houghton and Khandker, 2009). First, define an indicator of welfare. Second, establish a minimum acceptable standard of living or the poverty line. And finally, aggregate the information from the distribution of the welfare indicator relative to the poverty line (poverty rate).

Graph 1: Steps to welfare measurement



In Armenia, welfare has traditionally been measured using household consumption. The advantage of using household consumption is that it remains relatively stable over the year or from year to year whereas an alternative monetary measure of welfare like income may fluctuate from month to month or year to year. Households may also be more truthful in reporting consumption. Measuring household consumption requires aggregating and valuing several categories or groups of goods and services consumed. The consumption indicator may also be adjusted to reflect a comparable measure of welfare across households, regardless of their location, time of the interview, or demographic composition. The next few sections describe how total household consumption—the consumption aggregate—was calculated using the data from the ILCS 2019. It also describes how adjustments for spatial and temporal price differences and differences in household composition were performed to construct a welfare measure comparable across time, space, and household composition.

1.1 Food consumption

In the ILCS, food consumed by the members of a household is captured using a food diary. A diary is left with households on the first day of the interview with instructions to fill the diary daily. Until 2018, the diary referenced a period of 30 days, but starting in 2019, it was shortened to 14 days. The diary includes information on commodities used in the household by household members only. Commodities used as intermediate inputs for household production were not to be registered as food consumption in the diary, neither were food used in rituals or consumed in ceremonies. Households recorded food consumed at home that was procured from the market, produced in the farm, received as in-kind remuneration, or received free of charge. Households also recorded information in the diary on food eaten outside the home, for example in restaurants, cafes, and other public catering places. Money given to pupils and students for lunch was included in the diary as well.

For each food item consumed by the household, the value of food consumption was calculated by multiplying the amount consumed by the unit value. Unit values were calculated from the section on food purchases. For food items that were consumed but not purchased in the 14-day period, the missing unit values are imputed based on information from other households. The missing unit value was replaced by the median unit value

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of the food item in the same region and urban/rural area and households interviewed in the same quarter of 2019.² If the unit value for an item was missing after this first step, it was replaced by the median unit value calculated using households in the same region and interviewed in the same quarter. If the unit value for an item was missing after the second step, it was replaced by the median unit value of households in the same urban/rural area and interviewed in the same quarter. Fourth in the hierarchy were households interviewed in the same quarter. Finally, if an item still had a missing unit value, it was calculated using the national sample. If an item was not at all purchased by any household in the sample during the survey period, prices from the price survey carried out by the ARMSTAT were used.

In 2019, prices for 63 food items were obtained from the price surveys. Total food consumption for the 14 days was a simple sum of the value of all food items consumed over the period.

Although households were requested to fill the diary every day for 14 days, some households completed the diary for fewer than 14 days. Of the total sample, complete diary information was available for 4,760 households (92.2% of the sample) while at least a day of diary entry was missing for 405 households (7.8% of the sample).

Having fewer than 14 days' worth of data presented a problem when calculating monthly food expenditure because of two alternative interpretations of the missing days. It is possible that households did not consume anything on those days or that households forgot to fill the diary. After consultations with the ARMSTAT, it was decided that it was more reasonable to assume that missing days implies missing diary entry and not zero consumption. Therefore, to calculate total monthly food consumption, total food consumption was first divided by the number of days the diary was filled to get daily consumption, which was then multiplied by 30.4 (average number of days in one month) to obtain the household monthly food consumption. The average value of food consumption (valued using median unit values) by food categories is presented in Table 1.

Table 1: Average value of food consumption (2019)

Aggregate	AMD
Bread and cereals	17,864
Meat	15,908
Fish	1,563
Milk, cheese, and eggs	11,710
Oils and fats	4,356
Fruits	4,226
Vegetables	13,515
Sugar, jam, honey, chocolate, and confectionary	5,983
Food products n.e.c.	1,567
Coffee, tea, and cocoa	2,662
Non-alcoholic drinks	810
Food consumption, excl. alcohol	80,163
Food eaten outside of home	3,773
Total food consumption	83,936

Source: ILCS 2019

Note: Consumption is valued using median unit values. The means are weighted by population weight.

1.2 Non-Food consumption

There were changes in the non-food consumption modules in the ILCS 2019 as well. Until 2018, expenditures on public utilities, including electricity, gas, water supply, health, and education were recorded in the

² Median prices are preferred to mean prices for their robustness as a measure of central tendency, when dealing with skewed distributions and possible outliers. The same exercise, however, was performed using mean prices, as a sensitivity check.

household diary. But in 2019, there were explicit instructions not to include expenditure on those categories in the diary because the information was collected in the household questionnaire.

Several non-food items are excluded from the consumption aggregate, as they generally not indicative of higher welfare. Taxes and levies are not included in the non-food aggregate. Gifts by the household, remittance sent by the household, and charitable donations were also omitted to avoid double-counting. Consumption of leisure and public goods enhance household welfare, but they are usually not included in the aggregate because of the difficulty in valuing them. While minor repair and maintenance of vehicles are included, the purchase of vehicles is not because it is a lumpy expenditure. Infrequent expenditures like funerals, weddings, ceremonies, or other rituals are also excluded. The questionnaire allowed expenditure to be reported in four currencies – drams, rubles, dollars, euros. All currencies are converted to Armenian drams before aggregation. Non-food consumption includes items purchased and received as gifts. If items were received as gifts, the household is asked to estimate their value.

1.2.1 Non-Food consumption recorded in the diary

Consumption of the following non-food categories was captured in the diary³:

- 02 Alcohol, tobacco, and narcotics
- 03 Clothing and footwear
- 05 Furnishings, household equipment
- 07 Transport⁴
- 09 Recreation and culture
- 11 Hotels and restaurants
- 12 Miscellaneous goods and services

Only the total value of consumption and not the quantity of consumption was recorded for non-food items.⁵ Monthly non-food consumption was calculated in the same manner as monthly food consumption, by dividing total diary consumption by the number of days the diary was filled and multiply by 30.4 (average number of days in a month).

1.2.2 Non-Food consumption recorded in the diary and non-diary modules

The data for the following categories were sourced from both the diary and non-diary modules in the ILCS 2019.

1.2.2.1 04 Housing

Expenditure on public utilities like water, electricity, and gas was captured in the non-diary housing module whereas expenditure on repair and maintenance was captured in the diary. Expenditures on utilities were dropped if they were reported in the diary, assuming that their appearance in the diary was inadvertent.

1.2.2.2 08 Communication

The diary was the primary source of data for communications expenses. However, expenditure on communications was missing for 2,962 households (57% of the sample) in the diary. For these households,

³ The numbers refer to the 2-digit Classification of Individual Consumption According to Purpose (COICOP) categories.

⁴ Only operation of personal transport equipment, and transportation services.

⁵ Alcohol consumption is part of food diary so it is valued the same way as rest of the food items.

data on communication expenditure from the non-diary module was used. The non-diary module asked how much the household paid in the last month for landline telephone, internet, and cable television subscription.

1.2.2.3 Durable goods

Non-food consumption includes the flow of services received from durable goods during the year. Durable goods are assets purchased in one year but consumed over several years. When valuing the flow of services from durable goods, consumption should only include the value of the asset “used up” during the year. Usually, the user value of durable goods is estimated using three pieces of information: purchase price, current market value, and year of purchase. This allows an estimation of the annual rate of depreciation of an asset. Unfortunately, the ILCS does not collect information on the year of purchase or current market value. Only the original purchase price is known.

In absence of the necessary data to estimate the user cost of durable goods, a maximum lifespan is assigned to each durable good to estimate the flow of services of durables. The user value is then calculated using the purchase price and maximum lifespan, regardless of the year of purchase assuming a linear depreciation rate.⁶ If the purchase of a durable good that was also listed in the non-diary module was reported in the diary, it was dropped. If the diary recorded purchase of a durable good that was not listed in the non-diary module, it was included in the flow of durables.

1.2.3 Non-Food consumption recorded in the non-diary modules

Unlike in previous years when health and education expenditures were captured in the diary, they were captured in the non-diary modules in 2019.

1.2.3.1 06 Health

Health expenditures comprise a household’s cash and in-kind payments on medicine, medical procedures, and hospital services. The questionnaire asked households to report monthly expenditure on medicines and annual expenditure on hospital services. For medical expenses, households were asked for the number of visits to a service provider in the last 30 days and expenditure incurred in the last visit. Monthly expenditure on medical expenses were calculated by multiplying the expenditure in the last visit by the number of visits in the last 30 days assuming that every visit was equally costly.

1.2.3.2 10 Education

Education expenditure comprises monthly expenditure on pre-schooling and schooling. Pre-schooling expenditure includes expenditure on kindergarten institutions. Per the latest international guidelines, expenses on childcare services without educational programs are not a part of pre-schooling expenditure (UN DESA, 2018, p. 156). Schooling expenses are composed of private lessons, tuition and other required fees, and Parent Association activities. Expenditures reported in the ILCS on uniforms, textbooks, other materials, meals, transportation, lodging, etc., were not included under educational expenses to avoid double counting with consumption reported in the diary.

1.2.4 Rent

The inclusion of rents as part of the welfare consumption aggregate is not straightforward. Keeping comparability of welfare for tenants and home-owners living in comparable types of dwelling and location requires to either excluding rental values, or to measure the utility flow that the owner-occupied housing services generate (ECATSD 2019). The standard procedure to estimate the value of housing services is to run

⁶ The lifespan for durable goods is obtained from the ARMSTAT.

a hedonic regression to establish a relationship between rental payment and housing characteristics such as the age and size of the house, number of rooms, availability of infrastructure services, neighborhood characteristics, etc. The coefficients of this hedonic regression are then used to impute the value of housing for households that own their housing. This approach, however, requires a developed rental market, and uniform distribution of rental information over all groups in the population (ECATSD 2019). This method of valuing housing services is problematic in places where very few households live in rented dwellings and pay market rent. In ILCS 2019, only 5.5% of the sample (284 households) rented a house or an apartment. Therefore, value of housing services is not a part of the consumption aggregate.

1.2.5 Aggregate non-food consumption

The average value of non-food consumption by non-food categories is presented in Table 2.

Table 2: Average value of non-food consumption (2019)

Aggregate	AMD
Flow from durables goods	26,250
02 Alcoholic beverages, tobacco and narcotics	7,172
03 Clothing and footwear	7,121
04 Housing	24,156
05 Furnishings, household equip., maintenance of the house	4,699
06 Health	22,982
07 Transport	9,361
08 Communication	5,577
09 Recreation & culture	956
10 Education	4,962
11 Hotels and restaurants*	.
12 Miscellaneous goods and services	6,477
Total non-food expenditure	119,714

Note: Expenditure on hotels and restaurants is missing in the ILCS 2019 data. The means are calculated using population weight.

Chapter 2: Adjustments

The nominal consumption aggregate is adjusted for spatial and temporal price differences, and by differences in household composition to make them comparable across households.

2.1 Spatial and temporal price adjustment

To capture seasonal variation in consumption, the ILCS is implemented throughout the calendar year. Hence households interviewed later in the year may face different prices than households interviewed earlier in the year. Households in one part of Armenia may also pay a different price for the same item compared to households in another part of the country. Spatial heterogeneity in prices is particularly high in countries where markets are not well-integrated due to poor communication or transportation infrastructure. Such price differences must be adjusted for the interhousehold comparison of consumption to remain valid.

A food index disaggregated by quarter, region, and urban/rural location was calculated using unit values from the food expenditure data. The food index for a cell defined by region, urban/rural location, and the quarter of interview is simply the ratio of the cost of the average food basket (weighted by the share of each food item in total food expenditures in the cell) over the average national cost of the same basket in 2019. Price

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adjustment for non-food consumption was done using quarterly CPI obtained from the ARMSTAT.⁷ Non-food expenditure is not adjusted for spatial differences because of lack of spatially disaggregated unit values or prices. However, this omission is likely not consequential in a country like Armenia, where markets are well-integrated. The spatial and temporal adjustment factors for food and non-food consumption are presented in Table 3 and Table 4.

Table 3: Spatial adjustment factors for food consumption, 2019

Region	Q1		Q2		Q3		Q4	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Yerevan	1.124		1.088		0.983		1.000	
Aragatsotn	1.109	0.973	0.998	1.017	0.949	0.937	0.974	0.993
Ararat	1.032	1.086	1.071	1.015	0.993	0.944	0.986	0.927
Armavir	0.955	0.919	1.010	0.982	0.998	0.905	0.994	1.027
Gegharkunik	0.943	1.098	0.980	0.983	0.888	0.901	0.962	0.948
Lori	1.018	0.938	0.967	0.962	0.905	0.904	0.926	0.946
Kotayk	1.149	0.973	1.055	0.995	0.985	0.941	0.967	0.954
Shirak	1.045	1.052	1.022	0.976	0.925	0.850	0.944	0.901
Sjunik	1.084	0.993	1.127	1.025	1.011	1.000	1.074	1.034
Vayots Dzor	1.117	1.144	1.074	1.057	1.001	0.954	1.095	0.979
Tavush	1.139	0.925	1.018	1.119	0.994	1.000	1.043	0.998

Source: WB calculations using ILCS 2019

Table 4: Temporal adjustment factors for non-food consumption, 2019

Q1	Q2	Q3	Q4
0.991	0.999	1.002	1.007

Source: ARMSTAT

2.2 Household size, composition, and number of absent days of household members

Adjustments must also be made to account for the difference in needs arising from differences in the size and age composition of households. Consumption per adult-equivalent is estimated by dividing total household consumption by the number of adult equivalent members (EA_i). In this exercise, children aged 14 years or younger have a weight of 0.65, which means the cost of a child relative to an adult is assumed to be 0.65.

Allowance is also made for economies of scale in the household. Scale economies in consumption are derived from the fact that the level of consumption necessary to attain the same level of welfare does not increase linearly with household size. Household public goods are the best example of consumption items that exhibit scale economies. A one-bedroom apartment can house a couple just as well as it can house a single individual. Expenditure on utilities like electricity, water, sanitation, and garbage disposal does not increase in proportion to the number of household members.

The following formula is used to adjust for household composition and economies of scale:

$$EA_i = (A_i + a C_i)^q,$$

where EA_i is the adult equivalence for household i , A_i is the number of adults in the household, C_i is the number of children of age 14 or younger, a is the cost of a child relative to an adult, and q is a scale parameter to

⁷ Spatial price index for non-food consumption items cannot be constructed because of lack of spatially disaggregated non-food prices. Historical temporal non-food adjustments factors are in Table A15.

account for economies of scale. Following the precedence for Armenia, we set $a = 0.65$ and $q = 0.87$ in our exercise.

Furthermore, the number of days a household member was absent from the household during the survey period was discounted to calculate adult equivalence. For example, if an adult household member was present for only half the time during the survey period, she is counted as half a household member. The rationale is that failing to perform this adjustment underestimates per adult equivalent consumption because the household effectively had fewer members for part of the time. After discounting for the number of missing days the household's adults and children, the formula for adult equivalence is as following:

$$\text{Adjusted } EA_i = (\text{adjusted } A_i + a * \text{adjusted } C_i)^q$$

Chapter 3: Calculating the poverty lines

A poverty line defines the level of expenditure necessary for a household to meet the minimum level of living standards in a society. There are many ways to define the poverty line. In this exercise, we follow the cost of basic needs (CBN) approach. As mentioned earlier, the CBN method first estimates the cost of acquiring enough food to meet the minimum recommended daily energy intake. It then adds the cost of other essential goods and services to the food poverty line to estimate the total lower, upper, and average poverty lines.

Armenia's poverty measurement methodology uses an absolute poverty line, which means that the line remains fixed over time and is adjusted only for changes in the price levels in the economy. The previous calculation of the national poverty line was performed using data from the ILCS 2009. It is important to revise the poverty lines periodically, to reflect the evolving social consensus of what constitutes a minimum standard of living, as well as the underlying data on the population's consumption patterns and demographic composition.

The following sections describe the methodology for the construction of the food poverty line and the calculation of the allowance for non-food goods and services.

3.1 Food poverty line

The food poverty line is the minimum expenditure necessary for adequate food consumption. Two pieces of information are required to estimate the food poverty line: daily energy requirement and unit cost of calorie.

Food Poverty Line (FPL) = Calorie requirement per person per day * Unit cost of calorie

The following sub-sections describe in detail the steps to calculate daily energy requirement and unit cost of calorie.

3.1.1 Energy requirement

The first step in calculating the food poverty line is calculating the daily calorie requirement, which depends on the structure of the population, average body weight by age and sex, physical activity level (PAL) of the population, and the prevalence of individuals with special caloric needs (such as pregnant and breastfeeding women) in the population.

- *Population structure of Armenia:* The ILCS 2019 is the primary source of data for the demographic distribution of the population in Armenia (Table A23). Robustness checks were performed using the population projections developed by the ARMSTAT and the UN-DESA.
- *Body weight and energy requirements by age and sex:* Information on human energy requirements and weights are sourced from the report of a joint FAO/WHO/UNU expert consultation ([WHO, FAO](#)).

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[UNU, 2004](#)). The report lists average body weight and energy requirements separately for infants under the age of one and for individuals aged 1 year and older. Information on the body weight of 18-69 years old was obtained from the 2016-2017 National Household Health Survey on the Prevalence of Noncommunicable Disease Risk Factors in Armenia by the National Institute of Health (Table A17 and Table A18). An additional robustness analysis was performed using body weight and energy requirements reported in Amendola and Vechhi, (2011).

- *Physical activity level (PAL)*: The PAL is a major determinant of daily energy requirement. A population with a sedentary or light activity lifestyle will have a lower calorie requirement compared to a population with moderately active or vigorously active lifestyle. We use low and high PALs for sensitivity analysis. In the low PAL scenario, urban residents are assumed to lead a lifestyle of light activity (PAL = 1.53) and rural residents a moderately active lifestyle (PAL = 1.76). Under the high PAL scenario, urban and rural residents are assumed to follow moderately active (PAL = 1.76) and vigorously active (PAL = 2.25) lifestyles respectively ([Table 5.1, WHO, FAO, UNU, 2004](#)).
- *Urban/rural distribution*: The distinction between urban and rural residents is pertinent for the application of PALs. Data from the ILCS 2019 was used to estimate the urban/rural distribution of the population.
- *Pregnant and lactating women*: The primary source of data for the prevalence of pregnancy and breastfeeding is the ILCS 2019, while robustness analysis is conducted using DHS 2016 (
- Table A19 and
- Table A20). The ILCS records pregnancies of 12 or more weeks only. This implies women who are in the first trimester of pregnancy are not visible in the data. The survey also does not directly ask whether the mother of an infant is breastfeeding. We assume that all mothers of infants under the age of 1 are breastfeeding. If the age of an infant cannot be determined because of missing age, the infant is randomly assigned into exclusive breastfeeding (0 – 6 months) or partial breastfeeding (7 – 11 months) groups.

Additional energy requirements for pregnant women are as follows: 85 kcal/day for the first trimester, 285 kcal/day for the second trimester, and 475 kcal/day for the third trimester (WHO, FAO, UNU, 2004). The term of the fetus is not known in the data, so we use an average of the second and third trimester values. We also assume that mothers of infants under the age of 6 months are exclusively breastfeeding, requiring additional 675 kcal/day, while mothers of infants between the ages of 7 and 11 months are partially breastfeeding, requiring an extra 460 kcal/day.

With the inputs mentioned above, average energy requirement for the Armenian population in 2019 was 2,307 kcal/per capita/day under the assumption of low PALs and 2,682 kcal/per capita/day assuming high PALs. The poverty lines constructed for 2009 were based on the daily calorie requirement of 2,232 kilocalories per capita per day, the same level as in 2004 (World Bank, 2011). Online media sources mention that the Armenian Ministry of Health has calculated the daily energy requirement to be equal to 2,412 kcal.⁸ Although this information has not been officially verified, it is included for comparison purposes. Finally, the Food and Agriculture Organization (FAO) has calculated the Average Dietary Energy Requirement (ADER) for Armenia in 2020 to be 2,428 kcal.⁹

⁸Source: <https://www.evnreport.com/raw-unfiltered/armenia-s-food-basket-reality-or-battle-for-survival#:~:text=The%20minimum%20food%20basket%20for,calories%20per%20person%20per%20day.>

⁹ Source: <http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.Xw2boygzblU>. There are several methodological differences between WB's calculation of daily energy requirement using the ILCS and the FAO's calculation of Minimum Dietary Energy Requirement (MDER) and Average Dietary Energy Requirement (ADER). For more details on the FAO's methodology, please refer to FAO, 2020.

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Energy requirement (kcal/per capita/day)	Source
2,232	Calculations using ILCS 2009
2,307	WB calculations using ILCS 2019, assuming low PALs
2,412	Armenia Ministry of Health
2,438	Average Dietary Energy Requirement (ADER), FAO 2020
2,682	WB calculations using ILCS 2019, assuming high PALs

3.1.2 Unit cost of calorie

The second step in calculating the food poverty line is estimating the unit cost of calorie. Calories per unit (kilogram, liter, or piece) were assigned to each food item from a calorie conversion table provided by the ARSTAT (ARMSTAT, 2010). Calories were adjusted to the eatable portion of food. The value of food consumption is calculated using median unit values. Consumption of alcoholic beverages is included in the calculation of unit cost of calorie. Armed with these information, unit cost of calorie is calculated as the ratio of cost per unit to calorie per unit for each food item.

The 2019 ILCS collected information on 344 different food items and alcoholic and non-alcoholic beverages. Some items are consumed by only a handful of households, so their inclusion in the calculation of unit cost of calorie may lead to noisy estimates. A sensitivity analysis was performed to check the robustness of the unit cost of calorie if only a subset of food items were used in its calculation. Items whose cumulative share of expenditure in Armenia was less than 3%, 2%, and 1% of total food expenditure were dropped from the calculation of unit calorie cost.¹⁰

To calculate household cost per calorie for each household, a weighted average of cost per calorie was estimated, where the share of calories from the food item formed the weights. Mathematically, unit cost of calories for household i was calculated as following:

$$(\text{Unit cost of calorie})_i = \sum_{f=1}^n \frac{(\text{cost per unit})_f}{(\text{calorie per unit})_f} s_{fi},$$

where s_{fi} is the share of total calories obtained from food item f by household i .

The reference population is another important determinant of the unit cost of calorie and the food poverty line. The reference population cannot be “too poor” or “too rich.” It must be households close to the poverty line so that its food basket resembles that of a relatively poor population. Following previous work and established practice, households in the second, third, and fourth consumption deciles according to the adjusted per adult equivalent consumption aggregate is used as the reference population to calculate the unit cost of calorie and the food poverty line. A robustness analysis is conducted by choosing deciles 1 – 3 and deciles 2 – 3 as the reference groups.

The results for the sensitivity tests are presented in Table 5. Dropping the items whose cumulative share of food expenditure is less than 3% removes almost 60% of items (209 of 344) while they comprise only 5.8% of all observations. Unit cost of calorie is robust to dropped items with a cumulative share of 1% or 2% of food expenditure. In all cases, cost per calorie is increasing as the reference group goes from deciles 1-3 to 2-3 and 2-4. This is consistent with the expectation that the food basket shifts toward more expensive sources of calories as households get wealthier. The preferred value is 0.3385 AMD per kilocalorie obtained from

¹⁰ This is the share of expenditure based on the overall sample. The items may comprise a higher share of total food consumption for some households.

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dropping non-important food items which together constitute less than 3% of total food expenditure and using the reference group of second, third, and fourth deciles.

Food poverty line (FPL) is 23,763 AMD per person per month, the product of daily energy (or calorie) requirement and the unit cost of calories ($= 2307 \cdot 0.3386 \cdot (365/12)$).¹¹

Table 5: Unit cost of calorie

Reference Group (Deciles of per adult equivalent consumption)	Average Cost per Calorie (2019 AMD) Dropping food items with cumulative share of food expenditure up to:		
	1%	2%	3%
Deciles 1-3	0.3181	0.3176	0.3163
Deciles 2-3	0.3345	0.3332	0.3318
Deciles 2-4	0.3417	0.3404	0.3386
# of items dropped (out of 344)	157	189	209
# of records dropped (of 185,822)	3,523	7,561	10,712

Source: WB calculations using ILCS 2019

3.2 Non-Food components of poverty line: Lower and upper poverty lines

After estimating the food poverty line, the CBN method obtains the poverty lines by adding an allowance for non-food basic needs to the food poverty line. Unlike the food poverty line, which is grounded on biological needs of energy intake, there is little theoretical guidance to determine the level of non-food component. The most used approach is the one suggested by Ravallion (1994) and Ravallion and Bidani (1994). The less generous non-food allowance is estimated as the average expenditure on nonfood items of households whose *total* expenditures is approximately equal to the food poverty line. This allowance is then added to the food poverty line to obtain the lower poverty line (LPL). Mathematically, the LPL can be expressed as follows:

$$LPL = FPL + E[x_{non-food} | x_{total} \cong FPL],$$

where $x_{non-food}$ is per adult equivalent non-food consumption and x_{total} is per adult equivalent total consumption.

A more generous allowance for non-food consumption focuses on households whose *food* consumption is approximately equal to the food poverty line, i.e., households that are just meeting the daily calorie requirement with their food spending.¹² The poverty line obtained by adding this higher non-food allowance to the food poverty line is known as the upper poverty line (UPL):

$$UPL = FPL + E[x_{non-food} | x_{food} \cong FPL],$$

where x_{food} is per adult equivalent food consumption.

A nonparametric method is used to estimate the expected values in the equations above. To estimate the LPL, median non-food expenditure (per adult equivalent) of households whose *total* expenditure is within 5% of the food poverty line is estimated. Likewise, to estimate the UPL, median *food* expenditure (per adult equivalent) of the households whose *food* expenditure is within 5% of the food poverty line is estimated. Sensitivity analyses are also performed by taking the intervals around 10% and 15% of the food poverty line.

¹¹ The product does not exactly equal 23,370 because of rounding.

¹² Food consumption includes alcohol and food eaten outside of home.

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As a compromise, an average of the two poverty lines (Average Poverty Line, APL) is also suggested as an alternative poverty threshold (Haughton and Khandker, 2009).

Table 6 below shows the robustness analysis for lower (LPL), upper (UPL) and average (APL) poverty lines using intervals of 5%, 10%, and 15% around the food poverty line and consumption deciles. Panel A shows for consumption deciles 2-4 (our preferred deciles) and panel B and C shows for consumption deciles 1-3 and 2-3 respectively. For this exposition, we use an energy requirement of 2,307 kcal per capita per day. As can be seen, the poverty lines are robust to the choice of symmetric interval around the food poverty line to select the reference group.

Table 6: Sensitivity analysis of the lower and upper poverty lines to the choice of interval and deciles (Adult equivalent consumption per capita per month, AMD 2019)

Panel A: Consumption Deciles 2-4				
Interval	Food poverty line	Lower poverty line	Upper poverty line	Average poverty line
+ - 5%	23,763	35,054	53,043	44,048
+ - 10%	23,763	34,459	53,363	43,911
+ - 15%	23,763	35,054	53,363	44,208
Panel B: Consumption Deciles 1-3				
Interval	Food poverty line	Lower poverty line	Upper poverty line	Average poverty line
+ - 5%	22,199	31,581	51,186	41,383
+ - 10%	22,199	32,389	51,570	41,980
+ - 15%	22,199	32,115	50,913	41,514
Panel C: Consumption Deciles 2-3				
Interval	Food poverty line	Lower poverty line	Upper poverty line	Average poverty line
+ - 5%	23,288	33,893	52,888	43,391
+ - 10%	23,288	33,644	52,730	43,187
+ - 15%	23,288	33,893	52,807	43,350

Source: WB calculations using ILCS 2019. Note: All poverty lines defined in monthly AMD per adult equivalent.

3.3 Poverty lines and rates

Following the standard practice and the choice of appropriate parameters, described above, the poverty lines and rates for 2019 in Armenia is shown in Table 6 below. To reiterate, the choice of the consumption decile is 2-4, and interval around the food poverty lines is 5% and the energy requirement is 2,307 kcal per capita per day. Accordingly the lower poverty rate is 10.2%, upper poverty rate is 43.8% and average poverty rate is 26.4% for Armenia in 2019.

Table 6: Poverty rates and lines for Armenia 2019

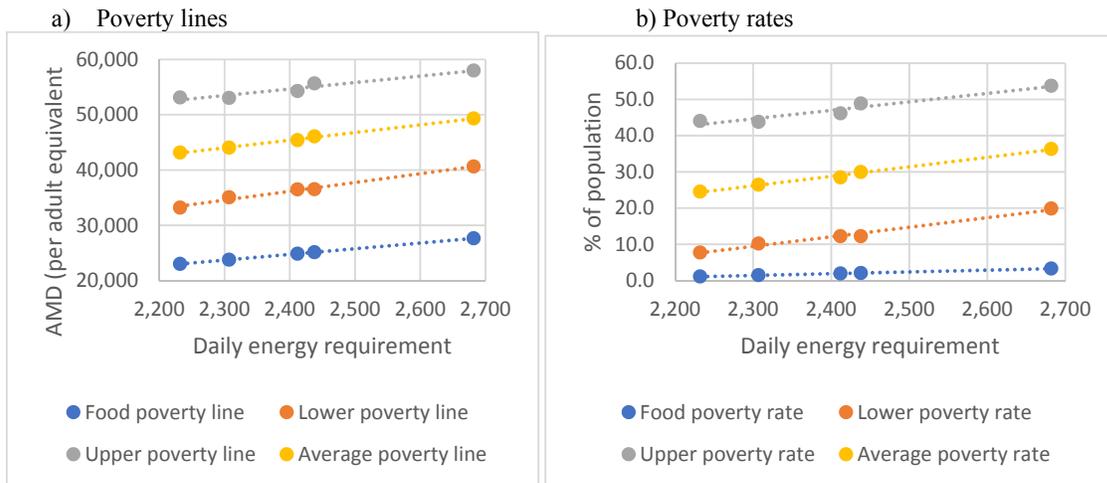
	Line	Rate
Food poverty	23,763	1.45%
Lower poverty	35,054	10.19%
Upper poverty	53,043	43.79%
Average poverty	44,048	26.43%

Source: WB calculations using ILCS 2019.

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While the preferred daily energy requirement is 2,307, computed using the ILCS 2019 and assuming low activity (PAL) in urban areas and a moderately active lifestyle in rural areas, Graph 2 shows the sensitivity of the poverty lines and poverty rates to different choice of daily energy requirement. The poverty lines and poverty rates increase linearly in response to the change in daily energy requirement.

Graph 2: Sensitivity of the poverty lines and poverty rates to daily energy requirement¹³



Source: WB calculations using ILCS 2019

Chapter 4: Comparison of the “new” and “old” poverty lines

Until 2018, the food poverty line was updated each year by adjusting the previous year’s line by changes in the food CPI. Similarly, lower and upper poverty rates were updated as a weighted combination of the food poverty line and non-food components of the lower and upper poverty lines.¹⁴ Specifically, food, lower, and upper poverty lines for year $t + 1$ (starting with year 2010) were estimated as follows:

$$FPL_{t+1} = FPL_t \times \text{Food CPI}_{t+1}$$

$$LPL_{t+1} = FPL_{t+1} + (LPL_t - FPL_t) \times \text{Non-food CPI}_{t+1}$$

$$UPL_{t+1} = FPL_{t+1} + (UPL_t - FPL_t) \times \text{Non-food CPI}_{t+1},$$

While the updates reflect the changes in prices over time, they do not adjust the composition of the consumption basket which is fixed in the year 2009. The poverty lines based on the 2009 and 2019 consumption baskets are presented in Table 78. The food poverty line based on the new consumption basket is about 6.1% lower than the line based on the old basket, while the lower poverty line is about 1.7 percent lower. In contrast, the 2019-based upper poverty line is 22.5% higher than the 2009-based upper poverty line, adjusted by CPI, to remain fixed in real terms.

¹³ The poverty lines and poverty rates are also reported in Table A25 and Table A26

¹⁴ Food and non-food CPI for years 2009 – 2019 are shown in Table A24

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The significantly higher level of the upper poverty line calculated in 2019 can be explained by the Engel coefficient. The ratio of food poverty line to upper poverty line was 56.5% in 2009, while it is only 44.8% in 2019. This implies the food share of the reference households for the upper poverty line is significantly lower in 2019 than in 2009, which in turn has the effect of boosting the upper poverty line. The ratio of food poverty line to lower poverty line, in contrast, was 69.3% in 2009 and it is 67.8% in 2019, suggesting the food share of the reference households for the lower poverty line has not shifted noticeably in the intervening period.

Table 7: Old and revised poverty lines for Armenia (2019 AMD, per adult equivalent)

	Food poverty line	Lower poverty line	Upper poverty line
2009 lines, 2019 prices	25,300	35,654	43,290
2019 lines, 2019 prices	23,763	35,054	53,043
% difference	-6.08%	-1.68%	+22.53%

Source: WB calculations using ILCS 2009 and 2019.

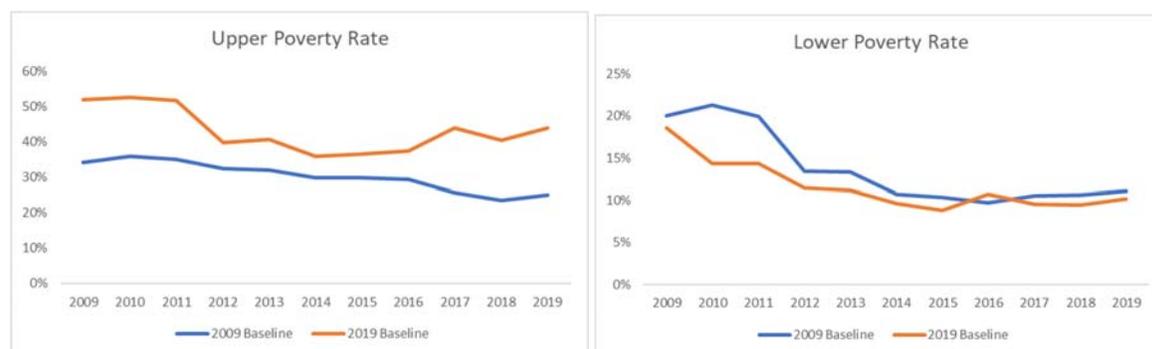
Note: Cumulative inflation between 2009 and 2019 was 44.7% for food items and 33.9% for non-food items.

The food poverty line calculated using the 2019 basket may be lower than what is obtained after updating the 2009 line because food CPI may not be representative of the diet of the reference population. If between 2009 and 2019, price of the food items consumed by the average population increased at a faster pace than price of the food items consumed by poorer segments of the population, the food poverty line obtained through price adjustment—but based on the 2009 consumption basket-- will overestimate the minimum expenditure necessary to meet the daily energy requirement for the reference population in 2019.

The poverty rates calculated from the ILCS 2019 differ from the 2009-2018 trend in three ways: (I) the consumption aggregate is calculated using the data from a revised questionnaire, (II) a new data collection methodology is introduced based on computer-assisted personal interviews (CAPI), and (III) the poverty lines are rebased in 2019. Next, we show how the poverty rate would have evolved had the poverty line not been updated, i.e., had poverty in 2019 been measured against the 2009 threshold after adjusting by prices. This approach maintains the real value of the poverty line, but it does not account for differences in the consumption aggregate due to changes in the modality of data collection and survey implementation issues.

The following graph shows “comparable” trend in lower and upper poverty rates for years 2009-2019 using the 2009-baseline and the 2019-baseline poverty lines.¹⁵ Using the 2009-baseline poverty lines (shown in blue), upper poverty rate in 2019 would have been 24.9%, an increase of 1.5 percentage point from 2018, while lower poverty rate would have increased by 0.5 percentage point from 10.6% to 11.1%. Likewise, a “parallel” trend can be constructed by deflating the 2019-baseline poverty lines backward to 2009. The trends are illustrated by the red lines in Graph 33 below.

Graph 3: Comparable poverty trends using the "new" and "old" poverty lines



¹⁵ The tables corresponding to the figure is in the Annex (Table A27)

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Source: WB calculations using the ILCS 2009-2019.

The effect due to the change in survey instruments, modality of data collection, and issues with survey implementation on the consumption aggregate is difficult to quantify because there is no comparable sample to compare the 2019 aggregates against. In absence of a statistically equivalent sample, we compare average per adult equivalent expenditure (total and by sub-aggregates) in 2019 against their levels in 2018 and 2017. Table 89 shows the proportion of households reporting positive consumption, median consumption conditional on positive consumption (nominal values), and median consumption unconditional on having positive consumption (nominal values). The consumption pattern in 2019 exhibits anomalies beyond what would be expected with normal year-to-year sampling variation. For instance, the share of households reporting food eaten outside of home is 16 – 17 percent in 2017 and 2018, it is 28 percent in 2019. The share of households reporting expenditure on education and health also sees a marked increase. It is notable that health and education are two of the expenditure categories that were moved from the diary to non-diary modules in the ILCS 2019. On the other hand, the share of households incurring expenses on clothing and footwear, routine household maintenance, communications, transport, recreation and culture, miscellaneous goods and services is noticeably lower in 2019 than in two previous consecutive years. No household expenditures were reported on restaurants and hotels in 2019. While consumption patterns change over time, drastic changes from one year to the next are unusual and may be explained more by measurement issues more than “real” changes in habits and customs.

Table 8: Comparison of the consumption pattern in 2017, 2018, and 2019 (AMD, nominal values)

Consumption categories	% of households with consumption > 0			Median consumption (consumption > 0)			Median consumption (unconditional)		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
01 - Food	100.0%	100.0%	100.0%	82,744	81,226	80,163	82,744	81,226	80,163
1.1 - Bread and cereals	100.0%	100.0%	100.0%	19,029	18,022	17,864	19,029	18,017	17,864
1.2 - Meat	99.0%	99.0%	96.0%	15,223	15,949	16,574	15,040	15,757	15,908
1.3 - Fish	40.0%	43.0%	33.0%	3,180	2,871	4,717	1,281	1,239	1,563
1.4 - Milk, cheese, and eggs	100.0%	100.0%	100.0%	11,558	11,182	11,714	11,556	11,174	11,710
1.5 - Oils and fats	100.0%	100.0%	100.0%	4,540	4,210	4,357	4,528	4,208	4,356
1.6 - Fruits	92.0%	94.0%	87.0%	5,548	5,493	4,884	5,100	5,144	4,226
1.7 - Vegetables	100.0%	100.0%	100.0%	13,402	13,444	13,517	13,394	13,440	13,515
1.8 - Sugar, jam, honey, chocolate, confectionery	97.0%	98.0%	92.0%	8,622	8,058	6,525	8,401	7,930	5,983
1.9 - Food products n.e.c	100.0%	100.0%	100.0%	859	996	1,568	859	996	1,567
1.10 - Coffee, tea, cocoa	100.0%	100.0%	100.0%	2,662	2,403	2,667	2,656	2,395	2,662
1.11 - Non-alcoholic drinks	44.0%	48.0%	32.0%	2,026	1,943	2,496	900	927	809.88
Food eaten outside of home	16.0%	17.0%	28.0%	12,375	9,906	13,652	1,940	1,727	3,773
02 - Alcohol, tobacco, narcotics	46.0%	48.0%	45.0%	14,761	14,291	15,938	6,722	6,915	7,172
03 - Clothing and footwear	38.0%	39.0%	25.0%	16,344	17,659	28,296	6,190	6,930	7,121
04 - Housing, water, electricity, gas, and other fuels	100.0%	100.0%	100.0%	26,073	26,461	24,185	26,043	26,461	24,156
05 - Furnishings, household equipment, and routine household maintenance	91.0%	91.0%	82.0%	3,774	4,154	5,716	3,451	3,793	4,699
06 - Health	59.0%	58.0%	64.0%	28,766	29,775	35,697	16,848	17,121	22,982
07 - Transport	71.0%	76.0%	53.0%	19,561	19,666	17,741	13,886	14,985	9,361
08 - Communication	96.0%	97.0%	86.0%	7,808	7,734	6,450	7,461	7,527	5,577
09 - Recreation and culture	39.0%	35.0%	15.0%	10,375	9,727	6,460	4,013	3,366	956
10 - Education	13.0%	12.0%	31.0%	34,937	41,788	16,269	4,434	5,158	4,962
11 - Restaurants and hotels	0.0%	0.0%	100.0%	100,000	210,000		165	740	
12 - Miscellaneous goods and services	95.0%	95.0%	82.0%	7,752	7,612	7,859	7,335	7,219	6,477
Durables	100.0%	100.0%	100.0%	24,421	24,082	26,251	24,419	24,080	26,251

Source: WB calculations using ILCS 2017, 2018, and 2019. Note: Median consumption is calculated using population weights.

Chapter 5: Robustness checks

The section presents the results of several other robustness checks done to assess the sensitivity of the poverty lines and poverty rates.

5.1 Rent

As discussed earlier, the standard method of imputing the value of housing on owner-occupied dwellings is complicated by the fact that the small sample on which to run the hedonic regression is very small. Nevertheless, we check how sensitive the poverty lines and poverty rates are to the inclusion of rent paid by renters. As can be seen in the Table 910 below, adding rent for renters has a minimal effect on the value of lower and upper poverty lines and the respective poverty rates.

Table 9: Sensitivity of the poverty lines and poverty rates to the inclusion of rent for renters

Aggregate	Lower poverty line (AMD)	Lower poverty rate (%)	Upper poverty rate (%)	Upper poverty line (AMD)
Excluding rent (baseline)	35,054	10.19	43.79	53,043
Including rent for renters	35,075	9.72	43.38	53,500

Source: WB calculations using the ILCS 2019. Note: All poverty lines defined in monthly AMD per adult equivalent.

5.2 Health expenditure

There is some debate on whether health expenditure should be included in welfare aggregates. Health expenditures are lumpy in nature, hence, they are sensitive to the choice of the reference period. Further, an increase in health expenditure may signify a loss in household welfare because it may be incurred due to a negative health shock. It is difficult to break down total health expenditure into welfare-enhancing and welfare-reducing subcomponents. A recommended empirical test is that health expenditures be included if they have high elasticity with respect to total consumption aggregate. An elasticity higher than 1 suggests that the health expenditures are discretionary.

The following Table 1011 shows the elasticity of different components of health expenditure (hospital expenses, medical expenses, and medicines) with respect to total consumption. Elasticities are below the recommended values for inclusion in the consumption aggregate. This indicates that including them does not serve to identify the poor more precisely and may lead to a noisier indicator (Deaton and Zaidi, 2002).

Nevertheless, health expenditures are retained in the welfare aggregate for two main reasons. First, health expenditure was a part of the “old” consumption aggregate (constructed based on the ILCS data), so its exclusion would have made the two aggregates less comparable. Second, Armenia is reforming its health insurance system and instituting a universal health insurance scheme, so out-of-pocket health expenses is a critical part of ongoing policy discussions.

Table 10: Elasticities of health expenditure with respect to total consumption

VARIABLES	Log Health Consumption	Log Hospital Expenses	Log Medical Expenses	Log Medicine Expenses
Log Consumption without Health	0.460*** (0.0496)			
Log Consumption without Hospital Expenses		0.638*** (0.106)		
Log Consumption without Medical Expenses			0.342** (0.168)	
Log Consumption without Medicine Expenses				0.436*** (0.0390)
Constant	3.749*** (0.597)	1.035 (1.295)	5.993*** (2.054)	3.731*** (0.471)
Observations	3,262	843	373	3,056

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R-squared	0.026	0.042	0.011	0.039
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Source: WB calculations using the ILCS 2019. The symbols *, ** and *** represent significance at the 10, 5 and 1 percent, respectively.

The exclusion of health expenditure can affect the poverty lines through a change in the reference group for food poverty line, the share of non-food consumption, and the level of aggregate consumption. Nonetheless, the poverty lines and poverty rates are robust to the exclusion of health expenditures (Table 11122).

Table 1112: Sensitivity of the poverty lines and poverty rates to the exclusion of health expenditure

Aggregate	Food poverty line (AMD)	Food poverty rate (%)	Lower poverty line (AMD)	Lower poverty rate (%)	Upper poverty line (AMD)	Upper poverty rate (%)
Including health expenditure (baseline)	23,763	1.45	35,054	10.19	53,043	43.79
Excluding health expenditure	23,431	1.60	33,810	12.17	49,364	43.95

Source: WB calculations using the ILCS 2019. Note: All poverty lines defined in monthly AMD per adult equivalent.

5.3 Discounting for absent days of household members

As discussed previously, the number of days a member was absent from the household during the survey period is discounted when estimating per adult equivalence. Table A28 in the annex shows that 76.2% of households had at least one member absent for at least one day during the survey period. This is reflected in the poverty lines and poverty rates as well, as they are sensitive to not discounting for the absent days of household members (Table 133).

Table 13: Sensitivity of the poverty lines and poverty rates to absent days of household members

Aggregate	Food poverty line (AMD)	Food poverty rate (%)	Lower poverty line (AMD)	Lower poverty rate (%)	Upper poverty line (AMD)	Upper poverty rate (%)
Discounting for absent days (baseline)	23,763	1.45	35,054	10.19	53,043	43.79
Not discounting for absent days	23,608	2.08	34,626	13.05	52,051	46.79

Source: WB calculations using the ILCS 2019. Note: All poverty lines defined in monthly AMD per adult equivalent.

Chapter 6: Discussion, conclusion and recommendations

The main objective of this exercise was to update the consumption aggregate, national poverty lines and national poverty estimates for Armenia using data from ILCS 2019, the most recent household income and expenditure survey. This note describes the technical and methodological aspects of this process. Two features of the update require careful explanation: (1) Why do the upper poverty line and upper poverty rate jump sharply from 2018 to 2019, and (2) Why do the upper and lower poverty rates increase in 2019 even when using the 2009-based poverty lines?

As noted earlier, the upper poverty rate jumps to 43.8% under the revised 2019 poverty line compared to 23.5% in 2018. This increase is primarily due to the update in the poverty line to reflect the consumption pattern in 2019. The national poverty lines for Armenia were last constructed using data from the ILCS 2009 round. Until 2018, poverty measurement in Armenia relied on an annual update to the poverty lines using the yearly consumer price index (CPI). This adjustment to the poverty lines by inflation rate accounts for changes in price-levels in the economy, keeping the poverty lines fixed in real terms. The adjustment, however, does not account for the secular change in the patterns of consumption that occurs over time. In fact, the ratio of the food poverty line to the upper poverty line was 56.5% in 2009, while it is only 44.8% in 2019. This implies

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that the food share of the reference households for the upper poverty line is significantly lower in 2019 than in 2009, which in turn has the effect of boosting the upper poverty line.

Although the need for rebasing the poverty lines are compelling, had the poverty lines not been revised in 2019 and the 2009 lines were simply updated to the 2019 prices, the upper poverty rate in 2019 would have still increased by 1.5 percentage points from 2018 to 24.9%. This increase could be explained by the difference in the survey questionnaire between ILCS 2018 and 2019. The ILCS 2019 introduced a new data collection methodology based on computer-assisted personal interviews (CAPI) and the diary days were shortened to 14 days from 30 days. Further, several modules of consumption that were previously part of the household diary were moved to the non-diary modules, among them health, communication, and education. As explained earlier, this could affect the calculation of the consumption basket.

Given the update in the poverty lines, and changes in data collection method and questionnaire design, quantifying the contribution of each source in increasing upper poverty rate in 2019 is difficult. However, one way to gauge this would be to consider the following: What would have been the trend in upper and lower poverty rates had the poverty lines been re-estimated each year? We recalculate the upper and lower poverty lines each year by applying year-specific food and non-food shares of the reference population to update the LPL and UPL and adjusting the Price Index for calculating the consumption aggregate. Table 14: What would have been the trend in upper and lower poverty rates had the PLs been re-estimated each year? below shows the historical trend.¹⁶ As can be seen, had the poverty lines been adjusted every year, the upper poverty rate in 2018 would have been significantly higher (45.4% compared to 23.5%) and a decrease of about 1.5 percentage point in 2019 (43.8%).

Table 14: What would have been the trend in upper and lower poverty rates had the PLs been re-estimated each year?

Year	Poverty lines recalculated every year		2009 poverty lines updated by annual food and non-food CPI	
	LPL	UPL	LPL	UPL
2009	20.10%	34.10%	20.10%	34.10%
2010	17.00%	41.80%	21.30%	35.80%
2011	19.20%	41.30%	19.90%	35.00%
2012	11.50%	40.20%	13.50%	32.40%
2014	11.30%	41.10%	10.80%	29.90%
2016	10.40%	41.10%	9.70%	29.40%
2017	11.00%	47.50%	10.60%	25.70%
2018	11.20%	45.40%	10.60%	23.50%
2019	10.19%	43.79%	10.19%	43.79%

Source: Calculations based on the ILCS. Note: Necessary data are unavailable for 2013 and 2015. 2016 assumes average price, no NFI spatial variation data were available.

In summary, although the upper poverty rate is significantly higher in 2019 compared to 2018, it is largely because the 2018 poverty lines were underestimated. Given that 10 years had passed since the poverty lines were last constructed, we recommend the number to be revised regularly (at least every 5 years) going forward.

References

Amendola, Nicola and Giovanni, Vecchi. (2011). Setting a Poverty Line for Iraq. Washington, DC: World Bank.

¹⁶ The recalculation could not replicate the official poverty lines in 2009, based on available microdata. The recalculation rates for 2009 (LPL= 10.5% and UPL=34.6%) are not shown in the table.

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Deaton, Angus and Zaidi, Salman. (2002) Guidelines for Constructing Consumption Aggregates For Welfare Analysis. Washington, DC : World Bank.

Europe and Central Asia Team for Statistical Development (ECATSD), 2019. ECAPOV 3.0 Harmonization Guidelines.

FAO, 2004. Human energy requirements. Retrieved from:
<http://www.fao.org/3/y5686e/y5686e00.htm#Contents>

FAO, IFAD, UNICEF, WFP and WHO, 2020. The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO.

Haughton, Jonathan and Khandker, Shahidur R.. (2009). Handbook on Poverty and Inequality. Washington, DC: World Bank.

Sen, A., 1985a, *Commodities and Capabilities*, Amsterdam: North-Holland.

United Nations Department of Economic and Social Affairs, 2018. Classification of Individual Consumption According to Purpose (COICOP) 2018.

World Bank, 2011. Armenia Poverty Update Using Revised Poverty Lines

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Annex

Table A15: Non-food quarterly consumer price index (CPI) in Armenia, 2009-2019

Year	Quarter			
	1	2	3	4
2009	0.997	0.998	1.004	1.021
2010	0.978	1.003	1.005	1.014
2011	0.989	0.999	1.001	1.009
2012	0.991	0.997	1.001	1.012
2013	0.969	0.979	1.021	1.030
2014	0.993	0.993	1.000	1.014
2015	0.992	1.002	0.999	1.001
2016	1.009	1.003	0.990	1.007
2017	0.995	0.997	0.999	1.009
2018	0.996	1.001	0.999	1.004
2019	0.991	0.999	1.002	1.007

Source: ARMSTAT

Table A16: List of durable items

Car	Gas cooker	Items in the “Other” Category
Motorcycle	Microwave oven	
Bicycle	Electric oven	Heating System
Mobile telephone	Electric heater	Blender
Personal computer (new or used)	Dishwashing machine	Bread Mixer
Television (B&W or color)	Refrigerator	Electric mixer
Parabolic antenna	Washing machine	Electric water heater
Air conditioner	Fan	Kettle
Video recorder	Sewing machine	Meat grinder
Video camera	Iron	Musical instruments
Photo camera	Vacuum cleaner	Tablet
Audio system (musical)	Furniture	Solar water heater
Electric cooker	Carpet	

Source: ILCS 2019

Table A17: Average body weight and energy requirements for infants

Age in Months	Boys		Girls	
	Body weight (kg)	Energy requirement (kcal/kg/day)	Body weight (kg)	Energy requirement (kcal/kg/day)
0	4.58	113	4.35	107
1	5.50	104	5.14	101
2	6.28	95	5.82	94
3	6.94	82	6.41	84
4	7.48	81	6.92	83
5	7.93	81	7.35	82
6	8.30	79	7.71	78
7	8.62	79	8.03	78
8	8.89	79	8.31	78
9	9.13	80	8.55	79
10	9.37	80	8.78	79
11	9.62	81	9.00	79

Source: FAO, 2004

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Table A18: Average body weight and energy requirements

Age in years	Boys		Girls	
	Energy requirement (kcal/day)	Body weight (kg)	Energy requirement (kcal/day)	Body weight (kg)
0	86.2/kg	7.7	85.2/kg	7.2
1	82.4/kg	11.5	80.1/kg	10.8
2	83.6/kg	13.5	80.6/kg	13.0
3	79.7/kg	15.7	76.5/kg	15.1
4	76.8/kg	17.7	73.9/kg	16.8
5	74.5/kg	19.7	71.5/kg	18.6
6	72.5/kg	21.7	69.3/kg	20.6
7	70.5/kg	24.0	66.7/kg	23.3
8	68.5/kg	26.7	63.8/kg	26.6
9	66.6/kg	29.7	60.8/kg	30.5
10	64.6/kg	33.3	57.8/kg	34.7
11	62.4/kg	37.5	54.8/kg	39.2
12	60.2/kg	42.3	52.0/kg	43.8
13	57.9/kg	47.8	49.3/kg	48.3
14	55.6/kg	53.8	47.0/kg	52.1
15	53.4/kg	59.5	45.3/kg	55.0
16	51.6/kg	64.4	44.4/kg	56.4
17	50.3/kg	67.8	44.1/kg	56.7
18-29	$(15.057 \times \text{kg} + 692.2) \times \text{PAL}$	74.6	$(14.818 \times \text{kg} + 486.6) \times \text{PAL}$	66.4
30-59	$(11.472 \times \text{kg} + 873.1) \times \text{PAL}$	74.6	$(8.126 \times \text{kg} + 845.6) \times \text{PAL}$	66.4
>60	$(11.711 \times \text{kg} + 587.7) \times \text{PAL}$	74.6	$(9.082 \times \text{kg} + 658.5) \times \text{PAL}$	66.4

Note: Body weights are from FAO, 2004 for 0-17 years and from NIH Armenia for 18 years and older. For infants less than 1-year old, average body weights of infants 0-11 months is used.

Table A19: Prevalence of pregnant and lactating women

Pregnant Women and Women with Infants Aged 0-11 months						
Age in years	Pregnant women		Infants 0-6 months		Infants 7-11 months	
	Urban	Rural	Urban	Rural	Urban	Rural
16	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
17	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
18-29	0.97%	1.14%	5.84%	5.34%	3.81%	4.48%
30-59	0.20%	0.19%	1.35%	0.96%	1.17%	0.57%
>60	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Source: WB estimates using ILCS 2019.

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Table A20: Prevalence of pregnant and lactating women

Pregnant Women and Women with Infants Aged 0-11 months						
Age in years	Pregnant women		Infant 0-6 months		Infant 7-11 months	
	Urban	Rural	Urban	Rural	Urban	Rural
16	1.25%	1.33%	0.00%	0.00%	0.00%	0.00%
17	0.00%	1.16%	0.00%	1.16%	0.00%	0.00%
18-29	4.96%	6.98%	5.25%	4.61%	3.48%	3.31%
30-59	1.39%	1.01%	0.81%	0.36%	0.59%	0.53%
>60	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Source: WB estimates using DHS 2016

Table A21: Daily individual caloric requirement (by low PALs)

Age in years	Male	Female	All
0	663	623	644
1	948	865	905
2	1,129	1,048	1,091
3	1,251	1,155	1,209
4	1,359	1,242	1,305
5	1,468	1,330	1,404
6	1,573	1,428	1,503
7	1,692	1,554	1,621
8	1,829	1,697	1,770
9	1,978	1,854	1,922
10	2,151	2,006	2,087
11	2,340	2,148	2,250
12	2,546	2,278	2,409
13	2,768	2,381	2,599
14	2,991	2,449	2,718
15	3,177	2,492	2,808
16	3,323	2,504	2,928
17	3,410	2,500	2,965
18-29	2,970	2,463	2,708
30-59	2,815	2,258	2,524
>60	2,369	2,033	2,181
Total	2,514	2,112	2,307

Source: WB estimates. PALs for adults (18+): Urban = 1.53; Rural = 1.76. All figures are kcal/day. Daily caloric requirements for females have been adjusted for higher caloric needs during pregnancy and lactation.

Table A22: Daily individual caloric requirement (by high PALs)

Age in years	Male	Female	All
0	663	623	644
1	948	865	905
2	1,129	1,048	1,091

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3	1,251	1,155	1,209
4	1,359	1,242	1,305
5	1,468	1,330	1,404
6	1,573	1,428	1,503
7	1,692	1,554	1,621
8	1,829	1,697	1,770
9	1,978	1,854	1,922
10	2,151	2,006	2,087
11	2,340	2,148	2,250
12	2,546	2,278	2,409
13	2,768	2,381	2,599
14	2,991	2,449	2,718
15	3,177	2,492	2,808
16	3,323	2,504	2,928
17	3,410	2,500	2,965
18-29	3,606	2,974	3,279
30-59	3,405	2,719	3,047
>60	2,856	2,439	2,623
Total	2,921	2,456	2,682

Source: WB estimates. PALs for adults (18+): Urban = 1.76; Rural = 2.25. All figures are kcal/day. Daily caloric requirements for females have been adjusted for higher caloric needs during pregnancy and lactation.

Table A23: Demographic structure of Armenia

Age group	Percent		Number of people	
	Male	Female	Male	Female
0-4	3.16%	2.91%	91,271	84,068
5-9	3.56%	3.12%	102,617	90,066
10-14	3.42%	3.04%	98,708	87,772
15-19	2.66%	2.61%	76,859	75,258
20-24	3.23%	3.01%	93,172	86,850
25-29	3.83%	3.78%	110,594	109,020
30-34	3.79%	3.96%	109,405	114,180
35-39	3.53%	3.61%	101,897	104,094
40-44	2.62%	3.10%	75,622	89,446
45-49	2.48%	2.86%	71,496	82,572
50-54	2.71%	3.29%	78,211	94,868
55-59	3.25%	4.27%	93,729	123,291
60-64	3.28%	3.90%	94,649	112,422
65-69	2.19%	3.19%	63,146	92,139
70-74	1.28%	1.95%	36,914	56,331
75-79	1.09%	1.80%	31,330	51,979
80-84	0.92%	1.35%	26,569	38,964
85+	0.42%	0.81%	12,074	23,376
Total:	47.43%	52.57%	1,368,261	1,516,696

Source: WB estimates from ILCS 2019

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Table A24: Yearly food and non-food consumer price index (CPI) in Armenia, 2009 – 2019

Year	Food CPI	Non-food CPI
2009	99.1	107.4
2010	109.4	107.1
2011	111.4	103.2
2012	102.0	103.1
2013	105.8	105.8
2014	101.7	104.2
2015	103.1	104.2
2016	96.7	99.8
2017	104.1	98.8
2018	102.3	102.6
2019	101.9	101.1

Source: ARMSTAT

Table A25: Minimum calorie requirement and poverty lines

Daily energy requirement (ER)	Food poverty line (AMD)	Lower poverty line (AMD)	Upper poverty line (AMD)	Average poverty line (AMD)
2,232	22,988	33,177	53,118	43,148
2,307	23,763	35,054	53,043	44,048
2,412	24,842	36,479	54,284	45,381
2,438	25,110	36,496	55,663	46,080
2,682	27,623	40,629	57,995	49,312

Source: WB estimates from ILCS 2019.

Table A26: Minimum calorie requirement and poverty rates

Daily energy requirement (ER)	Food poverty rate(%)	Lower poverty rate (%)	Upper poverty rate (%)	Average poverty rate (%)
2,232	1.1	7.7	44.0	24.5
2,307	1.4	10.2	43.8	26.4
2,412	1.9	12.2	46.2	28.5
2,438	2.0	12.2	48.9	29.9
2,682	3.3	19.9	53.8	36.3

Source: WB estimates from ILCS 2019.

Table A27: Comparable poverty trend

Year	Upper poverty rate		Lower poverty rate	
	2009 line	2019 line	2009 line	2019 line
2009	34.09%	51.97%	20.06%	18.63%
2010	35.79%	52.58%	21.27%	14.30%
2011	34.95%	51.75%	19.94%	14.32%
2012	32.40%	39.84%	13.48%	11.48%
2013	32.00%	40.65%	13.31%	11.17%
2014	29.86%	35.90%	10.77%	9.66%
2015	29.80%	36.39%	10.37%	8.86%
2016	29.37%	37.33%	9.74%	10.75%
2017	25.72%	43.96%	10.59%	9.53%
2018	23.51%	40.36%	10.62%	9.48%
2019	24.91%	43.79%	11.12%	10.19%

Source: WB estimates from ILCS 2009-2019.

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Table A28: Distribution of households with absent household members

Absenteeism	Share of households
No household member was absent during the survey period	76.2%
At least one household member was absent at least one day during the survey period	33.8%

Source: WB estimates from ILCS 2019.

Table A29: Share of food consumption (%)

	All population		Deciles 2 - 4	
	Share of total food consumption (2019)	Share of total food consumption (2009)	Share of total food consumption (2019)	Share of total food consumption (2009)
Aggregate				
Bread and cereals	21.3	25.9	24.6	27.2
Meat	19.0	16.0	17.3	14.8
Fish	1.9	1.1	1.9	1.0
Milk, cheese, and eggs	14.0	13.9	14.7	14.9
Oils and fats	5.2	6.0	5.4	6.3
Fruits	5.0	9.1	4.4	8.3
Vegetables	16.1	15.7	17.5	16.3
Sugar, jam, honey, chocolate, and confectionary	7.1	5.2	6.4	5.1
Food products n.e.c.	1.9	1.1	1.9	1.2
Coffee, tea, and cocoa	3.2	2.8	3.5	3.0
Non-alcoholic drinks	1.0	0.6	0.8	0.5
Food consumption, excl. alcohol	95.5	97.6	98.4	98.5
Food eaten outside of home	4.5	2.4	1.6	1.5
Total food consumption	100.0	100.0	100.0	100.0

Note: Source: WB calculations using ILCS 2009 and 2019